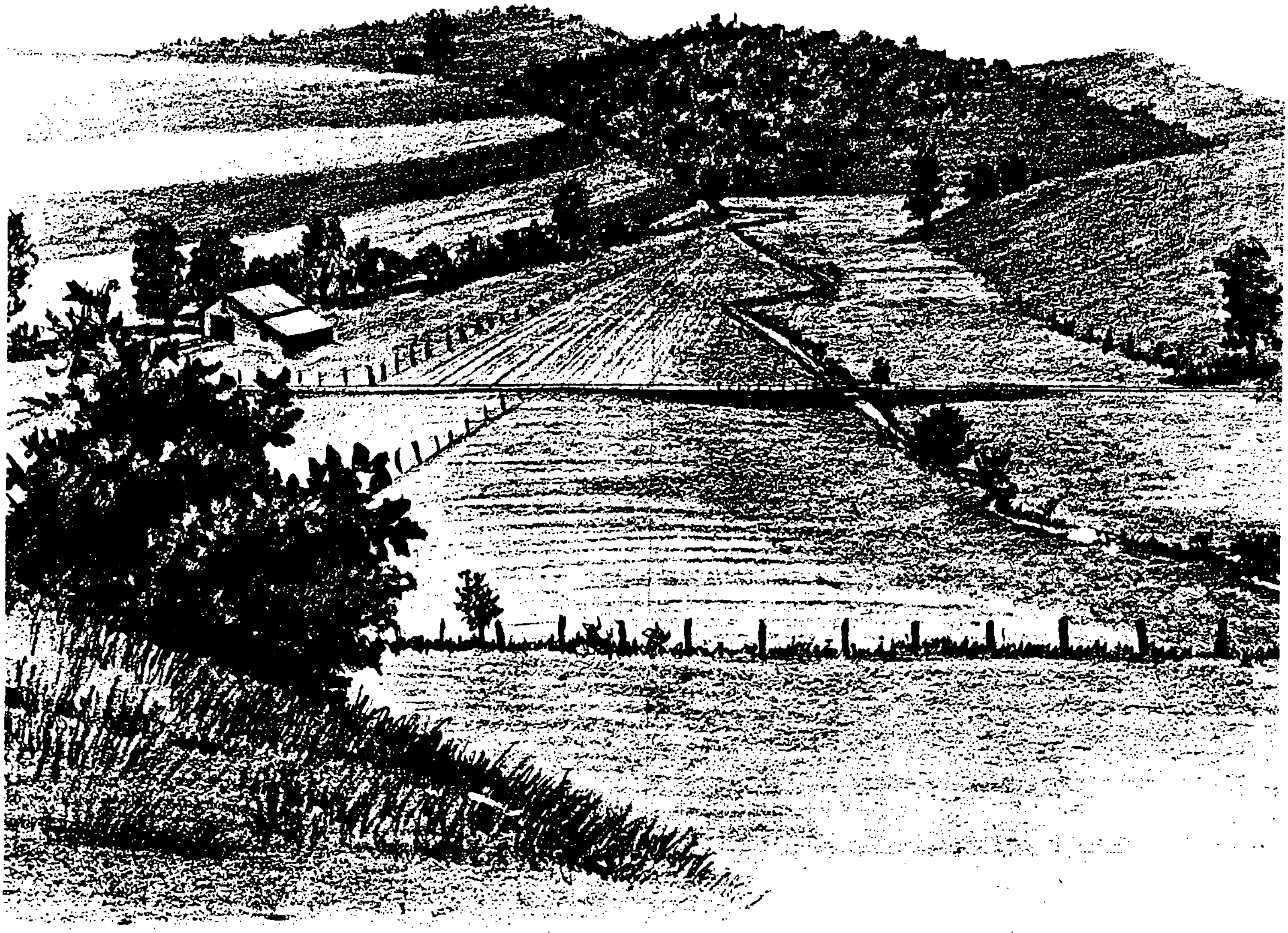
United States Department of Agriculture

Soil Conservation Service

In cooperation with the United States Department of Agriculture, Forest Service, the Ohio Department of Natural Resources, Division of Soil and Water Conservation, and the Ohio Agricultural Research and Development Center

Soil Survey of Jackson County, Ohio



Contents

Soil Series

Issued April 1985

Slope and erosion hazard are the major land use limitations. Seasonal wetness, droughtiness, flood hazard, and the moderately slow to very slow permeability of some soils also limit land use.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Jackson County is cold in winter and fairly warm and humid in summer. Winter precipitation, frequently snow, results in a good accumulation of soil moisture by spring and minimizes drought during summer on most soils. Normal annual precipitation is adequate for all crops that are adapted to the temperature and length of growing season in the area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Jackson in the period 1951-78. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 31 degrees F, and the average daily minimum temperature is 20 degrees. The lowest temperature on record, which occurred at Jackson on January 29, 1963, is -31 degrees. In summer the average temperature is 71 degrees, and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred on July 14, 1954, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 41 inches. Of this, 23 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 3.76 inches at Jackson on July 14, 1954. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 21 inches. The greatest snow depth at any one time during the period of record was 15 inches. On an average of 5 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 9 miles per hour, in spring.

Tornadoes and severe thunderstorms strike occasionally. These storms usually are local and of short duration and cause damage in a variable pattern.

Farming

According to the 1981 Ohio Agricultural Statistics (*6*), about one-third of the land in Jackson County is used for farming. This report lists the number of farms in the county at 530.

In 1980, the county received more income from the sale of crops than from livestock and livestock products because of the large mushroom crop. The leading income-producing grain crops were corn and soybeans; however, the cash receipts from the sale of mushrooms were higher than from these grains. Fruits, vegetables, tobacco, and hay were also important income-producing crops.

Another major source of farm income was the sale of livestock and livestock products (*4*). Most of that income was from the sale of cattle and calves; the rest was from hogs, dairy products, poultry, sheep, and wool.

Most of the cropland occurs on the gently sloping and strongly sloping soils. These soils have good surface drainage, but they also are subject to moderate or severe erosion.

Physiography, Relief, and Drainage

Jackson County is in the unglaciated Allegheny Plateau Region. It is extensively dissected by drainageways and has hilly and rough topography, except along the floors of preglacial stream valleys. These valleys were formed by the preglacial Teays River and its tributaries, the Marietta and Hamden Rivers. Subsequently, glacial deposits blocked this Teays drainage system and the glacial meltwater produced the present-day stream pattern (*9, 10, 11*). Many of these newer streams have cut gorge-like valleys.

The maximum difference in elevation in the county is about 445 feet. The lowest point, about 595 feet above sea level, is in Little Salt Creek near the northwestern corner of the county; and the highest point, about 1,040 feet, is on the western edge of the county near the Pike County line. The elevation of the main valleys is between 600 and 700 feet.

Four major watersheds dissect the county. They all drain into the Ohio River.

The Salt Creek Watershed is the county's largest. The topography consists primarily of very steep slopes and narrow ridgetops. It also includes some nearly level to strongly sloping areas left by the Marietta River. The drainage in this watershed now flows northwest.

The northeastern quarter of the county drains into Raccoon Creek. Sediment from acid mine spoil has clogged many stream channels, causing increased flooding and ponding along Little Raccoon Creek. As

clogging of stream channels increased, additional and larger wetlands were produced. Little Raccoon Creek and its tributaries are the drainage outlets for most of the Hamden Valley.

The southeastern quarter of the county drains into Symmes Creek. This stream's watershed includes some of the broad, gently sloping valley left by the preglacial Marietta River. Symmes Creek flows in a southerly direction and is very sluggish. Flooding is a common problem along this creek.

The Little Scioto Basin drains the southwestern part of the county. This area includes extensive acreage of gently sloping terrain, but steep slopes and narrow ridgetops are in part of the watershed. It should be noted that in this area the Little Scioto River crosses the preglacial Teays river valley twice as it flows to the south. This is an unusual physiographic feature.

History

The history of Jackson County has been shaped by the presence of salt, fertile soil, iron ore, timber, and coal.

The salt springs at the present-day site of Jackson, along Little Salt Creek, played an important role in the history of the county. Late in the eighteenth century, pioneers in search of farmland followed the numerous Indian trails that led to this ancient salt lick. Settlers were dependent on the salt for food preservation.

In 1816, Jackson County was organized. At first, the county's economy developed slowly due to the relatively small amount of fertile agricultural land. Then, iron ore was discovered and several furnaces, fueled by charcoal from local timber, were built to produce this valuable metal. Eventually, the stands of trees suitable for charcoal were depleted and the furnace operators had to turn to another fuel—coal. The supply of high-quality coal outlasted the iron ore, and when the iron industry declined, coal production remained an important industry.

In the years since the development of the iron and coal industries, numerous small industries have been established in the county. These, too, have been attracted by the county's natural resources.

Mineral Resources

Jackson County has a wide variety of mineral resources—coal, limestone, clay, sand, and iron ore. The deposits of high-grade iron ore, however, essentially have been depleted.

At least eleven coalbeds are mined in the county. The most productive of these are the Sharon No. 1, Quakertown No. 2, Lower Mercer No. 3, Clarion No. 4a, and Lower Kittanning No. 5. The Brookville No. 4, Middle Kittanning No. 6, and Upper Freeport No. 7 also are important.

The Vanport is the only limestone bed of any economic significance in the county. It generally is mined as part of the coal stripping process.

Three clays—the Sciotoville, the Lower Kittanning, and the Oak Hill—are the only clays presently used.

Silica sand is extracted from the Sharon Conglomerate. This sand is used for molding and for glass production.

Industry and Transportation

The main industries in Jackson County are coal mining, wood processing, steel fabrication, mushroom culture, food processing, the manufacturing of plastics and fire clay products, and other light manufacturing.

Mining occurs primarily in the eastern half of the county. Other industrial activity is concentrated around the towns of Jackson, Wellston, and Oak Hill.

Industry is served by a transportation network that includes U.S. Route 35 and State Routes 93, 124, 139, 279, 327, and 776. Three major railroads serve the county. These are the Consolidated Rail Corporation, The Chessie Railroad System, and the Detroit, Toledo, and Ironton Railroad.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil medium textured, moderately well drained, strongly sloping and moderately steep soils that formed in residuum and colluvium from siltstone and shale. Permeability is slow or moderately slow in these Wharton soils. The Rarden soils are moderately deep, medium textured, moderately well drained, gently sloping to steep soils that formed in residuum from acid clay shale. Permeability is slow in these Rarden soils, and the shrink-swell potential is high.

Of minor extent in this map unit are the well drained Shelocta soils and the sandier Clymer and Rigley soils on side slopes. Coolville soils, which have a thin loess mantle, are on ridgetops. The siltier Tilsit and Wellston soils are on ridgetops also. Ernest soils, which have a fragipan, are on foot slopes. The siltier Omulga soils are in preglacial valleys, and the somewhat poorly drained Orrville soils and the well drained Pope soils are on flood plains along small streams. Bethesda and Fairpoint soils, which have more rock fragments throughout, are in areas disturbed by surface mining.

The moderately steep and steep soils on hillsides in this map unit are used mainly for pasture and woodland. The gently sloping and strongly sloping soils on ridgetops are used for cropland, pasture, and woodland. Some abandoned farmland is reverting to brush, and other areas have been planted to pines. The soils on ridgetops and the strongly sloping soils on side slopes are moderately well suited to corn, soybeans, and small grains and well suited or moderately well suited to hay and pasture. The moderately steep and steep soils are poorly suited or generally unsuited to cropland and moderately well suited to generally unsuited to hay and pasture. These soils are moderately well suited or well suited to woodland. The Wharton soils are better suited to farming than Rarden soils because they have lower clay content in the subsoil and a deeper root zone. Erosion is a hazard, especially where slopes are long.

The gently sloping and sloping soils are moderately well suited as sites for buildings and poorly suited to septic tank absorption fields. The moderately steep and steep soils are poorly suited or generally unsuited to these uses.

2. Rigley-Rarden-Clymer

Deep and moderately deep, gently sloping to steep, well drained and moderately well drained soils formed in colluvium and residuum from sandstone and shale; on uplands

This map unit consists of soils on ridgetops and side slopes dissected by drainageways (fig. 3). The ridgetops mainly are narrow and have many knolls and low saddles. The hillsides make up about half of the mapped area and commonly are benched. Stream valleys generally are narrow. Slope ranges from 3 to 60 percent.

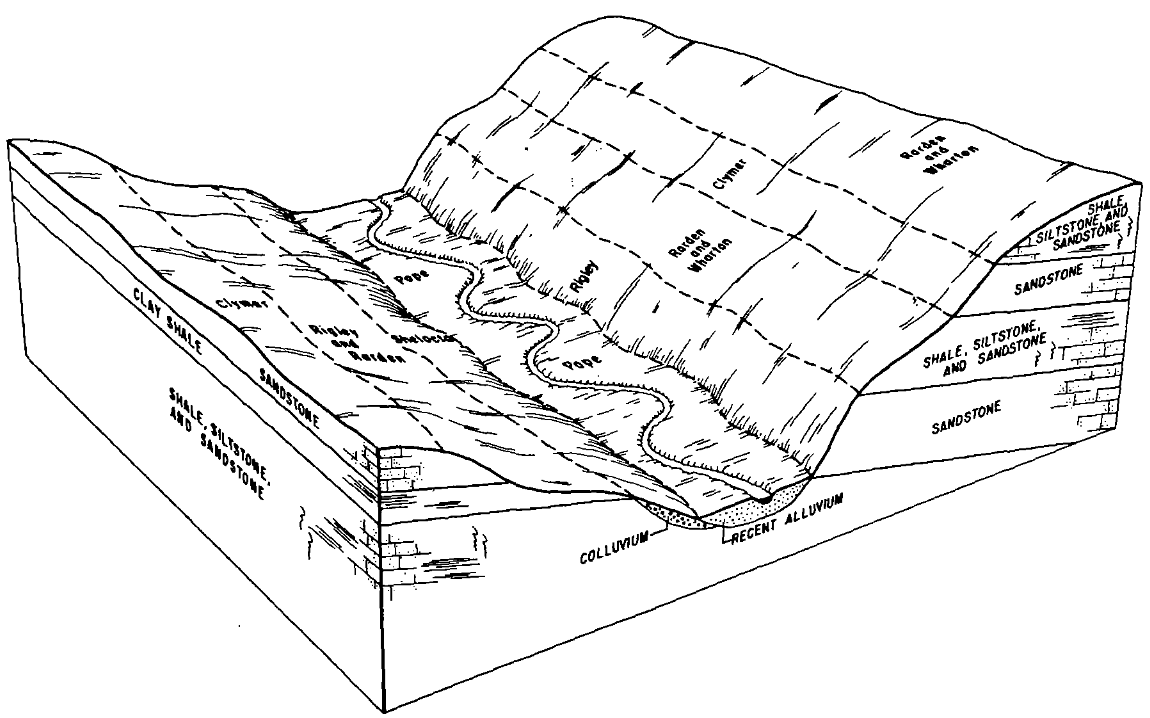


Figure 3.—Typical pattern of soils and parent materials in the Rigley-Rarden-Clymer map unit.

This map unit makes up about 21 percent of the county. It is about 35 percent Rigley soils, 20 percent Rarden soils, 15 percent Clymer soils, and 30 percent soils of minor extent.

Rarden soils are on side slopes and ridgetops; whereas, Rigley soils dominantly are on side slopes and Clymer soils commonly are on ridgetops. Rigley and Clymer soils are deep, well drained soils formed in residuum and colluvium from sandstone. The Rigley soils are strongly sloping to steep, medium textured and moderately coarse textured, moderately rapidly permeable soils. The Clymer soils are gently sloping to steep, medium textured, moderately permeable soils. The Rarden soils are moderately deep, medium textured, moderately well drained, slowly permeable soils formed in residuum from acid clay shale. The shrink-swell potential is high in the Rarden soils.

Of minor extent in this map unit are Shelocta soils on side slopes and Wharton soils on side slopes and ridgetops. These soils have more silt throughout than the dominant soils in the map unit. Also of minor extent are the siltier Omulga soils in preglacial valleys. Orrville and Pope soils that have less development in the subsoil are on flood plains along small streams. Bethesda and Fairpoint soils, which have more rock fragments throughout, are in areas disturbed by surface mining.

The steeper soils are mostly in woodland, and the less sloping soils on ridgetops and in narrow valleys are used as cropland, pasture, and woodland. The gently sloping and strongly sloping soils are well suited to moderately well suited to cropland, pasture, and woodland; whereas, the moderately steep and steep soils are poorly suited or generally unsuited to cropland and well suited or moderately well suited to woodland. Slope, erosion hazard, limited root zone, and droughtiness are major limitations to farming.

The gently sloping and strongly sloping soils are well suited or moderately well suited as sites for buildings and well suited to poorly suited to septic tank absorption fields. The moderately steep and steep soils are poorly suited or generally unsuited to these uses. The Rigley and Clymer soils are better suited to these uses than Rarden soils. Slope, moderate depth to bedrock, seasonal wetness, high shrink-swell potential, and, in the Rarden soils, slow permeability are major limitations.

3. Brownsville-Wharton

Deep, strongly sloping to steep, well drained and moderately well drained soils formed in residuum and colluvium from siltstone, sandstone, and shale; on uplands

This map unit consists of soils on narrow ridgetops and hillsides. The side slopes generally are uneven and commonly have less sloping foot slopes. The stream valleys generally are narrow. Slope ranges from 8 to 60 percent.

This map unit makes up about 6 percent of the county. It is about 40 percent Brownsville soils, 15 percent Wharton soils, and 45 percent soils of minor extent.

The Brownsville soils are on the steeper parts of side slopes. They are deep, medium textured, well drained soils formed mainly in colluvium and residuum from siltstone and sandstone. Permeability is moderate or moderately rapid in these soils. The available water capacity is low. The Wharton soils are on the ridgetops and less sloping parts of side slopes. These soils are deep, medium textured, strongly sloping and moderately steep, moderately well drained soils formed in residuum and colluvium from siltstone and shale. Permeability is slow or moderately slow in these soils. The available water capacity is moderate.

Of minor extent in this map unit are the sandy Clymer soils, the more clayey Rarden soils, and the siltier Wellston soils on the ridgetops and the sandier Rigley soils on side slopes. Shelocta soils are on side slopes. Pope and Skidmore soils irregularly decrease in content of organic matter with increasing depth. They are on narrow flood plains.

Most of this map unit consists of steep soils on side slopes that are mainly in woodland. Cleared areas on the ridgetops commonly are used for hay or pasture. Some abandoned farmland is reverting to woodland. The steep soils on side slopes generally are unsuited to cropland and pasture and are moderately well suited to woodland. The strongly sloping and moderately steep soils on ridgetops are moderately well suited or poorly suited to cropland and well suited or moderately well suited to pasture, hay, and woodland. Slope, droughtiness, and erosion hazard are major concerns of management. The north- and east-facing slopes are better woodland sites than south- and west-facing slopes because of less evaporation and cooler temperatures. These sites are less exposed to the drying effect of the prevailing winds and the sun.

The soils on ridgetops are moderately well suited or poorly suited as sites for buildings and poorly suited or generally unsuited as septic tank absorption fields. Slope, seasonal wetness, moderately slow or slow permeability, and shrink-swell potential are limitations to these uses. Land shaping is needed in most areas. The soils on side slopes generally are unsuited as building sites and septic tank absorption fields.

4. Rigley-Clymer-Brownsville

Deep, well drained, gently sloping to very steep soils formed in colluvium and residuum from sandstone and siltstone; on uplands

This map unit consists of soils on ridgetops and hillsides. The side slopes generally are irregular and commonly have rock ledges. The stream valleys generally are narrow. Slope ranges from 3 to 70 percent.

BhB—Bethesda shaly clay loam, 0 to 8 percent slopes. This deep, nearly level and gently sloping, well drained soil is on narrow to broad ridgetops in areas mined for coal. Ridge crests commonly are rounded and have smooth slopes. Rills and small gullies have formed on some ridges. Most basins are drained by a small waterway, but some do not have drainage outlets and contain intermittent pools. This soil is a mixture of rock fragments and of partly weathered fine-earth material that was in or below the profile of the original soil. Rock fragments, mostly flat and 1 to 5 inches long, are mainly shale, siltstone, and sandstone and smaller amounts of coal. Most areas are 3 to 45 acres in size.

Typically, the surface layer is brown, friable shaly clay loam about 4 inches thick. The substratum to a depth of about 60 inches is brown, firm very shaly silty clay loam and very channery clay loam. In a few areas, the surface layer and upper part of the substratum are clay loam or silty clay loam.

Included with this soil in mapping are small areas of the more acid and coarser textured Barkcamp soils. Also included are small areas of the less acid, reclaimed Fairpoint soils. The included soils are on landscape positions similar to those of the Bethesda soil and make up about 15 percent of most mapped areas.

Permeability is moderately slow in this Bethesda soil, and runoff is medium. Available water capacity is low. Potential frost action is moderate. The root zone is strongly acid to extremely acid in unlimed areas. Depth of the root zone varies within short distances because of differences in the density of the soil material.

This soil generally is unsuited to corn, wheat, and hay because the rock fragments in the surface layer interfere with tillage. Also, it is droughty, low in fertility, and very low in organic matter content. The surface layer puddles and crusts easily. Erosion is a moderate hazard in cultivated areas.

Many areas are in poor stands of grasses. This soil is poorly suited to pasture. The acidity, low fertility, shaly surface layer, and droughtiness are major concerns in pasture management. Areas that have not been limed and fertilized generally have thin stands of grasses with barren spots. Much of the rainfall in these areas runs off because of the poor structure of the soil and the lack of a plant cover. A protective plant cover and surface mulch can reduce runoff and soil loss by erosion and increase the water intake rate. Orchardgrass, tall fescue, and Korean lespedeza are some of the forage plants that make the best growth on this soil. Overgrazing reduces the stand and increases runoff. Proper stocking rates and rotation grazing are needed. Limiting grazing in winter and other periods helps to prevent surface compaction. In many areas, a water supply for livestock is not available, but potential reservoir sites are available.

Many areas are in poor stands of trees. This soil is best suited to trees that tolerate strongly acid to extremely acid, droughty soils. Mechanical planting is not practical in many areas because of the rock fragments in the surface layer. In most areas, mowing for weed control is possible.

Once settling has taken place, this soil is moderately well suited as a site for buildings and poorly suited to septic tank absorption fields. Areas that have not had sufficient time to settle are unsuited to these uses. An onsite investigation is needed. Because of the differential settlement of the soil, depth to bedrock should be considered in the site investigation. Stones hinder the digging of shallow excavations. Moderately slow permeability limits the use of this soil for septic tank absorption fields. Placing distribution lines in suitable fill material helps to improve septic tank absorption fields. If this soil is used as a construction site, erosion is a hazard; therefore, a vegetative cover should be kept on the site as much as possible. Sites for lawns are droughty and difficult to mow because of rock fragments in the surface layer. They should be blanketed with a suitable soil material to provide a more favorable root zone, to increase the available water capacity, and to cover small stones that would interfere with mowing.

The land capability classification is VIs. No woodland ordination symbol is assigned.

BhD—Bethesda shaly clay loam, 8 to 25 percent slopes. This strongly sloping and moderately steep, deep, well drained soil is mainly on mine spoil side slopes and to a lesser extent on mine spoil benches in areas mined for coal. Most areas have uneven slopes, and shallow gullies are common. Most areas are 3 to 100 acres in size.

Typically, the surface layer is yellowish brown, firm shaly clay loam about 5 inches thick. The substratum to a depth of about 60 inches is multicolored, firm very shaly clay loam. In some areas, the surface layer is channery clay loam, clay loam, or silty clay loam.

Included with this soil in mapping are small areas of the more acid, coarser textured Barkcamp soils. Also included are small areas of the less acid, reclaimed Fairpoint soils. The included soils are on landscape positions similar to those of the Bethesda soil and occupy about 15 percent of most mapped areas.

Permeability is moderately slow in this Bethesda soil, and runoff is rapid or very rapid. The available water capacity is low because of the high content of coarse fragments and compactness in the root zone. The potential frost action is moderate. Unless the soil is limed, the root zone is strongly acid to extremely acid. Depth of the root zone varies within short distances because of differences in the density of the soil material.

Most areas support a sparse stand of grasses. This soil is generally unsuited to the commonly grown field crops and hay crops and is poorly suited to pasture. The soil is a poor medium for root development; it is droughty, low in fertility, and very low in organic matter content. The surface layer is shaly, has weak structure, and puddles and crusts easily. Erosion is a severe or very severe hazard in cultivated areas. Areas that have not been limed and fertilized generally support thin stands of grasses and are interspersed with barren spots. The use of ground cover and surface mulch reduces runoff and erosion and increases the water intake rate. Orchardgrass, tall fescue, and Korean lespedeza are some of the forage plants that grow best on this soil. Overgrazing reduces the stand and increases runoff and soil loss by erosion. A water supply for livestock often is not available, but many areas have potential reservoir sites.

This soil is best suited to trees that can tolerate strongly acid to extremely acid, droughty soils. Mechanical planting is not practical in many areas because of the rock fragments in the surface layer. Mowing for weed control is possible in most areas.

Once the soil has settled, areas where slopes are 8 to 15 percent are moderately well suited as sites for buildings and poorly suited to septic tank absorption fields. Onsite investigation is needed. Areas where the soil has not had sufficient time to settle or where slopes are 15 to 25 percent are generally unsuited to these uses. Because of the differential settlement of the soil, the depth to bedrock should be considered during the site investigation. Hillside slippage and runoff are important considerations also. The moderately slow permeability and slope limit the use of this soil for septic tank absorption fields. Septic tank absorption fields can be improved by placing the distribution lines in suitable fill material. Keeping a vegetative cover on the soil as much as possible during construction will reduce erosion. Because of the compact root zone, the soil is droughty if used for lawns, and the rock fragments interfere with mowing. The sites for lawns should be blanketed with suitable fill material.

The land capability classification is VIs. No woodland ordination symbol is assigned.

BhE—Bethesda shaly clay loam, 25 to 40 percent slopes. This deep, well drained, steep soil is mainly on mine spoil side slopes in areas surface mined for coal. Slopes are uneven, and gullies are common. This soil consists of a mixture of rock fragments and of partly weathered fine-earth material that was in or below the original soil. Rock fragments are mainly shale, siltstone, and sandstone. Most areas are long and narrow or irregularly shaped and 3 to 60 acres in size.

Typically, the surface layer is brown and yellowish brown, friable shaly clay loam about 5 inches thick. The substratum to a depth of about 60 inches is multicolored, firm and very firm channery clay loam, very channery clay loam, and very shaly clay loam.

Included with this soil in mapping are small areas of the more acid and coarser textured Barkcamp soils. Also included are small areas of the less acid, reclaimed Fairpoint soils. The included soils are on landscape positions similar to those of the Bethesda soil and make up about 15 percent of most mapped areas.

In this Bethesda soil, permeability is moderately slow, and runoff is very rapid. The available water capacity is low. The organic matter content is very low. The potential frost action is moderate. Unless the soil is limed, the root zone is strongly acid to extremely acid. Depth of the root zone varies within short distances because of differences in density of the soil material.

Most areas have a sparse cover of grasses and trees. This soil generally is unsuited to hay, pasture, and the commonly grown field crops because of its steep slope, droughtiness, low fertility, and very low organic matter content. In most places, the high content of coarse fragments in the surface layer prevents tillage with normal equipment. If the soil is cultivated, erosion is a very severe hazard. The limed and fertilized areas generally support thin stands of grasses and are interspersed with barren spots. Use of ground cover and surface mulch reduces runoff and erosion and increases the water intake rate.

This soil is best suited to trees that can tolerate strongly acid to extremely acid, droughty soils. Grasses and legumes commonly are used to provide ground cover during the establishment of trees. Mechanical planting is not practical because of the steep slope and rock fragments throughout the soil.

This soil generally is unsuited to sanitary facilities and building site development because of the steep slope, possibility of hillside slippage, and moderately slow permeability.

The land capability classification is VIIe. No woodland ordination symbol is assigned.

BrD—Brownsville channery silt loam, 15 to 25 percent slopes. This deep, well drained, moderately steep soil is on hillsides. Most areas are long and irregularly shaped and 5 to 120 acres in size.

Typically, the surface layer is dark brown, friable channery silt loam about 7 inches thick. The subsoil is dark yellowish brown and yellowish brown, firm very channery silt loam and channery loam about 18 inches thick. The substratum is brownish yellow and yellowish brown, friable very channery loam. Siltstone bedrock is at a depth of about 45 inches. The surface layer in some areas is channery loam.

Included with this soil in mapping are a few small areas of the Rigley soils. They have more sand and fewer coarse fragments in the subsoil and are on the upper part of side slopes and on benches. Also included are a few areas of the moderately well drained Wharton soils on the lower part of hillsides and in coves. The included soils make up about 15 percent of most mapped areas.

Permeability is moderate or moderately rapid in this Brownsville soil. The available water capacity is low.

soil is wet causes compaction and reduces the quality and quantity of forage.

This soil is moderately well suited to woodland. Machine planting of tree seedlings is practical on this soil. Species selected for planting should be tolerant of a high clay content in the subsoil. Good site preparation and disking, spraying, or mowing will help reduce plant competition and insure seedling survival and growth. Using seedlings that have been transplanted once or mulching the soil will reduce the seedling mortality rate. The windthrow hazard can be reduced by harvesting techniques such as evencutting.

This soil is moderately well suited as a site for buildings and poorly suited to septic tank absorption fields. Because of seasonal wetness and the high shrink-swell potential, it is better suited to houses without basements than to houses with basements. Foundations and footings should be designed to prevent structural damage from the shrinking and swelling of the soil. Drains at the base of footings and exterior wall coatings commonly are used to help keep basements dry. On sites for local roads and streets, artificial drainage and a suitable base material will reduce damage from the shrinking and swelling of the soil. Placing the distribution lines of septic tank absorption fields in suitable fill material and using an absorption area that is larger than normal will increase the absorption of effluent.

The land capability classification is IIe. The woodland ordination symbol is 4c.

RaC2—Rarden silt loam, 8 to 15 percent slopes, eroded. This moderately deep, strongly sloping, moderately well drained soil is on ridgetops and in bands around hillsides. Slopes are dominantly smooth, except for irregularities around shallow drainageways in some areas. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of the original surface layer and the subsoil material. Most areas are long and narrow or irregularly shaped and range from 3 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper part is strong brown and yellowish red, firm silty clay loam and silty clay; and the lower part is yellowish red and yellowish brown, mottled, firm silty clay. Depth to weathered shale bedrock is generally about 34 inches; in places, depth to shale bedrock is more than 40 inches. In many places, the surface layer is mixed brown and strong brown silty clay loam.

Included with this soil in mapping, and making up about 15 percent of most mapped areas, are small areas of Clymer, Tilsit, Wellston, and Wharton soils. Clymer and Wharton soils have less clay in the subsoil than the Rarden soil and are on knolls. The Tilsit soils, which have a fragipan, and the well drained Wellston soils are in less sloping areas.

Permeability is slow in this Rarden soil, and runoff is rapid. A seasonal high water table is between depths of 24 and 36 inches during extended wet periods. The root zone is moderately deep, and the available water capacity is low. The shrink-swell potential is high. Unless the soil is limed, the root zone is strongly acid or very strongly acid.

Many areas are used for pasture and hay. This soil is moderately well suited to corn, soybeans, small grains, hay, and pasture. It can be cropped successfully, but the cropping system should include a high proportion of hay or pasture crops. Erosion is a serious hazard, especially where the slopes are long. Hard clods and a crust on the surface form if the soil is cultivated when it is soft and sticky. Standard management practices such as conservation tillage that leaves crop residue on the soil surface, use of cover crops, and tilling at the proper moisture content reduce erosion, improve tilth, and help to maintain the organic matter content of the soil. Grazing when the soil is wet causes compaction and reduces the quality and quantity of the forage.

Many areas are in woodland. This soil is moderately well suited to woodland. Species selected for planting should be tolerant of a high clay content in the subsoil. Laying out logging roads and skid trails on the contour facilitates the use of equipment. Using seedlings that have been transplanted once or mulching the surface will reduce the seedling mortality rate. The windthrow hazard can be reduced by harvesting techniques such as evencutting.

This soil is moderately well suited as a site for buildings and is poorly suited to septic tank absorption fields. Because of seasonal wetness and the high shrink-swell potential, it is better suited to houses without basements than to houses with basements. Foundations should be designed to prevent structural damage from the shrinking and swelling of the soil. Excavations around foundations should be backfilled with a material having low shrink-swell potential. Drains at the base of footings and exterior wall coatings commonly are used to help keep basements dry. The distribution lines in septic tank absorption fields should be laid out across the slope to reduce seepage to the soil surface. Placing the distribution lines of septic tank absorption fields in a suitable fill material will increase the absorption of effluent. Erosion is a serious hazard during construction, so a protective plant cover should be maintained on as much of the site as possible. On sites for local roads and streets, artificial drainage and replacing the surface layer and subsoil with a suitable base material will reduce the damage from shrinking and swelling of the soil. Some areas are suitable sites for ponds.

The land capability classification is IIIe. The woodland ordination symbol is 4c.

RbC2—Rarden-Wharton silt loams, 8 to 15 percent slopes, eroded. This complex consists of strongly

sloping, moderately well drained soils on the upper part of side slopes and on narrow ridgetops. Erosion has removed part of the original surface layer of these soils, and the present surface layer is a mixture of the original surface layer and the subsoil material. The moderately deep Rarden soil makes up 40 to 45 percent of most areas, and the deep Wharton soil makes up 35 to 40 percent. Because the two soils occur in relatively narrow alternating bands on the hillsides, it is not practical to separate them in mapping. Most areas of this complex are long and narrow and 3 to 100 acres in size.

Typically, the Rarden soil has a dark brown, friable silt loam surface layer about 6 inches thick. The subsoil is about 28 inches thick. The upper part is strong brown, firm silty clay loam; the middle part is yellowish red, mottled, firm and very firm silty clay; and the lower part is yellowish brown, mottled, very firm silty clay loam. Weathered shale bedrock is at a depth of about 34 inches.

Typically, the Wharton soil has a brown, friable silt loam surface layer about 6 inches thick. The subsoil is about 40 inches thick. The upper part is strong brown, friable silt loam; and the lower part is strong brown, mottled, firm clay loam. Weathered shale and siltstone bedrock is at a depth of about 46 inches.

Included with these soils in mapping, and making up about 15 percent of most mapped areas, are small areas of well drained Clymer and Rigley soils. These included soils are on small knolls.

Permeability is slow in the Rarden soil and slow or moderately slow in the Wharton soil. A seasonal high water table is between depths of 24 and 36 inches in the Rarden soil and 18 and 36 inches in the Wharton soil. The available water capacity is low in the Rarden soil and moderate in the Wharton soil. Runoff is rapid. The Rarden soil is strongly acid or very strongly acid in the subsoil. The Wharton soil is strongly acid to extremely acid in the subsoil.

Most areas are used for pasture and hay. These soils are well suited to hay and pasture and moderately well suited to corn, soybeans, and small grains. The Wharton soil is better suited to crops and pasture than the Rarden soil because it has less clay in the subsoil and a deeper root zone. A cropping system on these soils should include a high proportion of hay or pasture plants. Erosion is a serious hazard, especially where the slopes are long. Standard management practices, such as conservation tillage that leaves crop residue on the soil surface, use of cover crops, and tilling at proper moisture content, reduce erosion, improve tilth, and maintain the organic matter content of the soil. Grazing when the soil is wet causes compaction, reduces the quality of the protective plant cover, and lowers forage production.

Many areas are used for woodland. These soils are well suited to moderately well suited to woodland. Species selected for planting on the Rarden soil should be tolerant of a high clay content in the subsoil. Using seedlings that have been transplanted once or mulching will reduce seedling mortality on the Rarden soil. The windthrow hazard can be reduced on this soil by harvesting techniques such as evencutting. Laying out logging roads and skid trails on the contour facilitates the use of equipment.

These soils are moderately well suited as a site for buildings and poorly suited to septic tank absorption fields. The Wharton soil is better suited to these uses than the Rarden soil. Because of the seasonal wetness of both soils and the high shrink-swell potential of the Rarden soil, they are better suited to houses without basements than to houses with basements. Foundations and footings should be designed to prevent structural damage from the shrinking and swelling of the soil. Excavations around foundations should be backfilled with a material having low shrink-swell potential. Drains at the base of footings and exterior wall coatings commonly are used to help keep basements dry. Erosion is a serious hazard during construction, so a protective plant cover should be maintained on the site as much as possible during construction. On sites for local roads and streets, artificial drainage and a suitable base material will reduce the damage from the low strength and shrinking and swelling of the soils and from frost action in the soils. The distribution lines in septic tank absorption fields should be laid out across the slope to reduce seepage to the soil surface. Placing the distribution lines of septic tank absorption fields in suitable fill material will increase the absorption of effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4c for the Rarden soil and 2o for the Wharton soil.

RbD2—Rarden-Wharton silt loams, 15 to 25 percent slopes, eroded. This complex consists of moderately steep, moderately well drained soils on side slopes. Erosion has removed part of the original surface layer of these soils, and the present surface layer is a mixture of the original surface layer and the subsoil material. The moderately deep Rarden soil makes up 40 to 45 present of most areas, and the deep Wharton soil makes up 40 to 45 percent. Because the two soils are in relatively narrow alternating bands on the hillsides, it is not practical to separate them in mapping. The areas commonly are long and narrow and are dissected by small drainageways. Most areas are 10 to 150 acres in size.

Typically, the Rarden soil has a brown, friable silt loam surface layer about 8 inches thick. The subsoil is about 30 inches thick. The upper part is strong brown and yellowish red, firm silty clay loam and silty clay; the middle part is yellowish red, mottled, firm clay; and the lower part is yellowish red and strong brown, mottl
firm shaly silty clay loam. Weath

yellowish brown and strong brown, firm sandy loam about 36 inches thick. The substratum to a depth of about 60 inches is yellowish brown, friable channery loamy sand. In some areas, sandstone bedrock is between depths of 40 and 60 inches. The subsoil has more clay in some areas.

Included with this soil in mapping, and making up about 15 percent of most mapped areas, are small areas of Clymer soils on side slopes and areas of the moderately well drained Rarden and Wharton soils in seeps on side slopes.

In this Rigley soil, permeability is moderately rapid. Runoff is medium or rapid. The root zone is deep. The available water capacity is low. Unless the soil is limed, the root zone is strongly acid to extremely acid.

Many areas are in pasture. This soil is moderately well suited to corn and soybeans and is well suited to hay and pasture. Controlling erosion and conserving moisture are the major concerns of management. The surface layer is easily tilled throughout a wide range of moisture content. Using conservation tillage that leaves crop residue on the soil surface, winter cover crops, grassed waterways, and contour stripcropping and including grasses and legumes in the cropping system help to maintain tilth, reduce runoff, and control erosion. Because nutrients are moderately rapidly leached, this soil responds better to smaller but more frequent or timely applications of fertilizer than to one large application. This soil is well suited to grazing early in spring. In summer, pasture plants grow slowly because the soil is droughty. Proper stocking rates and pasture rotation help to prevent overgrazing and reduce erosion.

Many areas are in woodland, and this soil is well suited to woodland. Seedlings grow well if competing vegetation is controlled or removed by spraying, mowing, or disking.

This soil is well suited as a site for buildings and septic tank absorption fields, even though the slope limits these uses. Buildings should be designed to conform to the natural slope of the land. Land shaping is needed in some areas. Driveways should be located across the slope to reduce erosion and the angle of incline. Sites for local roads can be improved by using a suitable base material to reduce damage from frost action. The distribution lines of septic tank absorption fields should be laid out across the slope to reduce seepage to the surface. If this soil is used as a construction site, erosion is a hazard; therefore, a protective plant cover should be kept on the site as much as possible.

The land capability classification is IIIe. The woodland ordination symbol is 2o.

RgD—Rigley sandy loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is in bands around hillsides and on ridgetops. Most areas are long and narrow and 5 to 125 acres in size.

Typically, the surface layer is dark brown, friable sandy loam about 3 inches thick. The subsurface layer is brown, friable sandy loam about 4 inches thick. The subsoil is yellowish brown and strong brown, friable and firm sandy loam and channery sandy loam about 37 inches thick. The substratum to a depth of about 60 inches is yellowish brown, friable extremely channery sandy loam. Bedrock is between depths of 40 and 60 inches in some areas.

Included with this soil in mapping are small areas of Brownsville soils that contain more coarse fragments throughout the soil and are on the lower part of slopes. Also included are small areas of the moderately well drained Rarden soils, which are on benches, and small areas of the moderately well drained Wharton soils, in seeps. The included soils make up about 15 percent of most mapped areas.

Permeability is moderately rapid in this Rigley soil, and runoff is rapid. The root zone is deep, and the available water capacity is low. Unless the soil is limed, the root zone is strongly acid to extremely acid.

Many areas of this soil are used for pasture and hay. This soil is poorly suited to corn and small grains and moderately well suited to hay and pasture. Erosion is a very severe hazard if the soil is cultivated, plowed for seedbed preparation, or overgrazed. The surface layer is easily tilled throughout a wide range of moisture content. The cropping system should include meadow crops most of the time. Conservation tillage that leaves crop residue on the soil surface, winter cover crops, grassed waterways, and contour stripcropping help to maintain tilth, reduce runoff, and control erosion. The soil is well suited to grazing early in spring. During pasture seeding, the use of cover crops, companion crops, or no-till seeding helps to control erosion. Proper stocking rates and pasture rotation help to prevent overgrazing.

This soil is well suited to trees, and many areas are in woodland. Plant competition can be reduced by spraying, mowing, or disking. Erosion can be reduced by locating roads and skid trails on the contour, using water bars, and other erosion control practices. Locating logging roads and skid trails on or near the contour will also reduce the equipment limitation. The north- and east-facing slopes are better woodland sites than the south- and west-facing slopes because of less evapotranspiration and cooler temperatures. These sites are less exposed to the drying effects of the prevailing winds and the sun.

This soil is poorly suited as a site for buildings and septic tank absorption fields. Land shaping is needed in most areas. If this soil is used as a construction site, erosion is a hazard; therefore, a protective plant cover should be maintained on the site as much as possible. Placing the distribution lines of septic tank absorption fields across the slope will reduce lateral seepage of effluent to the soil surface. Locating driveways across the slope will reduce the hazard of erosion and the angle the steep slope of both soils and the slow permeability, high shrink-swell potential, seasonal wetness, slippage hazard, and moderate depth to bedrock of the Rarden soil. The hazard of erosion is severe if the plant cover is removed. Trails in recreation areas should be protected against erosion and established across the slope, if possible.

The land capability classification is VIIe. For the Rigley soil, the woodland ordination symbol is 2r on the north aspect and 3r on the south aspect; for the Rarden soil, it is 3c on the north aspect and 4c on the south aspect.

RrG—Rigley-Rock outcrop association, very steep. This deep, well drained Rigley soil and Rock outcrop are in bands around hillsides and on hillsides along deeply dissected drainageways. Slopes dominantly are 40 to 70 percent. The areas are 10 to 200 acres in size. Rigley sandy loam makes up about 60 percent of most areas, and Rock outcrop makes up 15 percent. The Rigley soil dominantly is on the upper two-thirds of side slopes, and Rock outcrop occurs as high, massive sandstone bedrock escarpments on the upper part of side slopes. Because of present and expected uses, it was not considered practical to separate the soil and Rock outcrop at the scale used in mapping.

Typically, the Rigley soil has a surface layer of very dark brown, friable sandy loam about 3 inches thick. The subsurface layer is mixed dark brown and brown, friable sandy loam about 3 inches thick. The subsoil, about 35 inches thick, is yellowish brown and brownish yellow, friable sandy loam. The substratum to a depth of about 60 inches is light yellowish brown, loose channery sandy loam. The surface layer in areas below Rock outcrop commonly is channery or bouldery sandy loam. The subsoil has more sand or clay in some areas.

Rock outcrop is on vertical cliffs and ledges and in some places in gorges and caves. The maximum height of the cliffs is about 150 feet. Ledges and overhangs 5 to 10 feet high are numerous and discontinuous.

Included in mapping, and making up about 25 percent of the association, are Brownsville, Shelocta, and Wharton soils; shallow, excessively drained soils; and moderately deep, somewhat excessively drained soils that have bedrock at a depth of 10 to 40 inches. Brownsville, Shelocta, and Wharton soils are on the lower one-third of the side slopes, and the shallow and moderately deep soils are on the upper half of side slopes. Areas of the included soils are less than 20 acres in size.

Permeability is moderately rapid in the Rigley soil, and the available water capacity is low. The root zone is deep. Runoff is very rapid. The subsoil is strongly acid to extremely acid.

This association generally is unsuited to cropland and pasture because of the very steep slope, Rock outcrop, and erosion hazard.

This association is moderately well suited to woodland, and most areas are used for woodland. Erosion is a severe hazard. It can be reduced by locating logging roads and skid trails on or near the contour, using water bars, or other erosion control practices. The slope and Rock outcrop severely limit the use of planting and harvesting equipment. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more water available for growth and cooler temperatures because of less exposure to the prevailing wind and the sun. Tree growth is considerably less on included soils near the bedrock escarpments. Hemlock, mountain laurel, magnolia, and maidenhair fern grow in coves and on north- and east-facing slopes.

Because of the steep slopes and rock outcroppings, this association generally is unsuited as a site for buildings and sanitary facilities. Construction of facilities for recreation and urban uses is very difficult on this association. Some areas are scenic and can be used for hiking trails, parks, and lookout points. The hazard of erosion is severe if the plant cover is removed. Trails in recreation areas should be protected against erosion and should cross the slope, if possible.

The land capability classification is VIIe. The woodland ordination symbol is 2r for the Rigley soil on the north aspect and 3r on the south aspect. Rock outcrop is not assigned a woodland ordination symbol.

ShE—Shelocta-Rarden association, steep. This association consists of a deep, well drained Shelocta soil and a moderately deep, moderately well drained Rarden soil on side slopes of uplands. Areas are in bands of irregular width around hillsides and are 10 to 200 acres in size. Slopes dominantly are 25 to 50 percent and are both smooth and benched. Shelocta silt loam makes up 50 percent of most areas, and Rarden silt loam makes up 25 percent. The Shelocta soil commonly is on the upper and lower parts of side slopes, and the Rarden soil is on mid-slope benches and on shoulder slopes. Because of present and expected uses of the soils, it was not considered practical or necessary to separate them at the scale used in mapping.

Typically, the Shelocta soil has a surface layer of dark brown, friable silt loam about 4 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 39 inches thick. The upper part is yellowish brown, firm silt loam and channery silty clay loam; and the lower part is yellowish brown, firm shaly silty clay loam and extremely channery silty clay loam. Hard siltstone interbedded with thin layers of shale is at a depth of about 48 inches.

Typically, the Rarden soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is about 29 inches thick. The upper part is brown, firm silty clay loam; and the lower part is reddish brown and yellowish red, mottled, firm silty clay. Shale bedrock is at